

### **REMARKS**

Claims 12-20 and 23-24 are pending in this application. By this Amendment, claims 12-19 are amended, claims 21 and 22 have been canceled, and new claim 24 has been added. No new matter is added.

### **Restriction Requirement**

The Office Action maintains claims 19 and 20 as withdrawn from consideration. Applicants respectfully request rejoinder of claims 19 and 20 upon allowance of claim 12, from which claims 19 and 20 depend. The Office Action notes that claims 19-20 and 12-18, 23 are related as process of making and product made. Applicants note that the U.S. Patent and Trademark Office Manual of Patent Examining Procedure (MPEP) requires that "if applicant elects claims directed to the product, and a product claim is subsequently found allowable, withdrawn process claims which depend from...the allowable claim will be rejoined" (MPEP 821.04). Thus, since claim 12 is allowable for at least the reasons discussed below, rejoinder and examination of claims 19 and 20 are respectfully requested.

### **Claim Objection**

The Office Action objects to claim 18 for containing asserted informalities. Applicants believe that this objection is overcome with the change "an amino acid" to --a polynucleotide sequence-- in claim 18. Reconsideration and withdrawal of the objection to claim 18 are respectfully requested.

### **Section 112, Second Paragraph, Rejections**

A) The Office Action rejects claim 12 under 35 U.S.C. 112, second paragraph, as being indefinite. In particular, the Examiner asserts that it is not clear what is meant by the terminology "low temperatures" as recited in claim 12.

Applicants note that the present specification describes that because the "chitanase cDNAs of the present invention are capable of digesting chitin at low temperature, the introduction of [the] chitanase cDNAs into plants can confer plant disease resistance in low temperature environments, so that plant varieties can be provided with high resistance against psychrophilic plant pathogens such as snow molds" (present specification page 16, lines 6-13). As the present specification also notes, in an environment of 0°C or below 0°C, crops "are often attacked by snow molds..." (present specification page 1, lines 11-16).

Thus, in order to expedite prosecution of this application, claim 12 has been amended to change "low temperature" to --low temperature of 0°C or below--.

B) The Office Action also rejects claim 13 under 35 U.S.C. 112, second paragraph, as being indefinite. Applicants have changed the terminology "barley-derived chitanase" to recite --barley chitanase-- as the Examiner has interpreted the terminology.

C) The Office Action also rejects claim 15 under 35 U.S.C. 112, second paragraph, as being indefinite. Applicants have changed the terminology "rye-derived chitanase" to recite --rye chitanase-- as the Examiner has interpreted the terminology.

D) The Office Action also rejects claim 17 under 35 U.S.C. 112, second paragraph, as being indefinite. Applicants have changed the terminology "spring wheat-derived chitanase" to recite --spring wheat chitanase-- as the Examiner has interpreted the terminology.

E) The Office Action rejects claims 12-18 and 23 under 35 U.S.C. 112, second paragraph, as being indefinite because it is unclear whether the term "derived" means to isolated from a winter wheat plant" or whether it encompasses recombinants, variants and mutants of any wheat or non-wheat chitanase cDNA. Applicants have changed the terminology "winter wheat-derived chitanase" in claims 12-18 and 23 to recite --winter wheat chitanase--.

Applicants have also added a new dependent claim as follows:

--24. The winter wheat chitinase cDNA of claim 12, wherein the cDNA has been synthesized from mRNA extracted from winter wheat.--

F) The Office Action rejects claims 13, 15 and 17 under 35 U.S.C. 112, second paragraph, as being indefinite because cDNAs do not include amino acids. Applicants have amended claims 13, 15 and 17 as suggested by the Examiner. Thus, claim 13 has been amended to recite "...that said cDNA comprises 771 nucleotides which encode an amino acid sequence comprising 256 amino acids..."

G) The Office Action rejects claims 13, 15 and 17 under 35 U.S.C. 112, second paragraph, as being indefinite because the claims compare a polynucleotide sequence with a polypeptide sequence. Applicants have amended claims 13, 15 and 17 as suggested by the Examiner. Thus, claim 13 has been amended to recite "...and encodes an amino acid sequence that is 98% identical with barley..."

H) The Office Action also rejects claims 13, 15 and 17 under 35 U.S.C. 112, second paragraph, as being indefinite because the SEQ ID NO. for the sequences in these claims are not given. However Applicants note that these claims do not require specific sequences which are instead listed in claims 14, 16 and 18. Thus Applicants do not believe it is necessary to amend these claims to include the sequences at this time. However, have amended claim 14 to depend from claim 13.

For at least the above reasons, reconsideration and withdrawal of the rejections under 35 U.S.C. § 112, second paragraph, are respectfully requested.

#### **Section 112, First, Rejections**

The Office Action rejects claims 12 and 23 and claims 13, 15 and 17 under 35 U.S.C. 112, first paragraph, because it is asserted (a) that the specification, while being enabling for polynucleotides (cDNA) isolated from winter wheat, does not reasonably provide enablement for any polynucleotides (cDNAs); and (b) the specification does not contain any disclosure of the structure of all DNA sequences that encode a chitanase enzyme at low temperatures.

In the above-amended claims, the claimed cDNA is specifically limited to winter wheat chitanase cDNA rather than any cDNA as the Examiner previously interpreted the claims to define. Thus, Applicants believe that these rejections under 35 U.S.C. 112, first paragraph, are moot with the amended claims.

Reconsideration and withdrawal of the rejections of claims 12 and 23 and claims 13, 15, 17 under U.S.C. § 112, first paragraph, are respectfully requested.

### **Section 102 Rejections**

A) The Office Action rejects claims 12 and 13 under 35 U.S.C. 102(b) as being anticipated by Bryngelsson et al. As the Examiner notes, Bryngelsson is directed to a barley chitanase cDNA. As the present claims require a winter wheat chitanase cDNA, Bryngelsson et al. can not anticipate the present claims.

B) The Office Action rejects claims 12 and 15 under 35 U.S.C. 102(a) as being anticipated by Griffith et al. As the Examiner notes, Griffith is directed to a rye chitanase cDNA. As the present claims require a winter wheat chitanase cDNA, Griffith et al. can not anticipate the present claims.

C) The Office Action rejects claims 12 and 17 under 35 U.S.C. 102(b) as being anticipated by Liao et al. As the Examiner notes, Liao is directed to a spring wheat chitanase cDNA. As the present claims require a winter wheat chitanase cDNA, Liao et al. can not anticipate the present claims.

For the above reasons, reconsideration and withdrawal of the rejections under 35 U.S.C. § 102 are respectfully requested.

### **Conclusion**

Applicants respectfully submit that this application is in condition for allowance and such action is earnestly solicited. If the Examiner believes that anything further is desirable in order to place this application in even better condition for allowance, the Examiner is invited to contact Applicants' undersigned representative at the telephone number listed below to schedule a personal or telephone interview to discuss any remaining issues.

In the event this paper is not being timely filed, Applicants respectfully petition for an appropriate extension of time. Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 01-2300.

Please charge any fee deficiency or credit any overpayment to Deposit Account No. 01-2300.

Respectfully submitted,

A handwritten signature in black ink, reading "Robert K. Carpenter". The signature is fluid and cursive, with a long horizontal line extending from the end of the name.

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Attachment: Marked-up Copy of Claims 12-19 to Show Changes

**Marked-up Copy of Claims 12-19 to Show Changes**

12. (Amended) A winter wheat [-derived] chitinase cDNA characterized in that said cDNA encodes a protein with chitinase activity at low temperatures of 0°C or below.

13. (Amended) A winter wheat [-derived] chitinase cDNA according to claim 12, characterized in that said cDNA comprises 771 nucleotides which encode an amino acid sequence comprising 250 amino acids and [has 98% identity (on amino acid sequence level)] encodes an amino acid sequence that is 98% identical with barley [-derived] chitinase cDNA.

14. (Amended) A winter wheat [-derived] chitinase cDNA according to claim 13, [12], characterized in that said cDNA has nucleotide sequence that encodes an amino acid sequence listed as SEQ. ID No. in Fig. 1.

15. (Amended) A winter wheat [-derived] chitinase cDNA according to claim 12, characterized in that said cDNA comprise 972 nucleotides which encode an amino acid sequence comprising 323 amino acids and encodes an amino acid sequence that is 68% identical [has 68% identity (on amino acid sequence level)] with rye [-derived] chitinase cDNA.

16. (Amended) A winter wheat [-derived] chitinase cDNA according to claim 15, characterized in that said cDNA has nucleotide sequence that encodes an amino acid sequence listed as SEQ. ID. No. 2 in Fig. 2.

17. (Amended) A winter wheat [-derived] chitinase cDNA according to claim 12, characterized in that said cDNA comprises 960 nucleotides which encode an amino

acid sequence comprising 319 amino acids and encodes an amino acid sequence that is 95% identical [has 95% identity (on amino acid sequence level)] with spring wheat [-derived] chitinase cDNA.

18. (Amended) A winter wheat [-derived] chitinase cDNA according to claim 17, characterized in that said cDNA has a nucleotide sequence corresponding to [an amino acid] a polynucleotide sequence listed as SEQ. ID. No. 3 in Fig. 3.

19. (Twice Amended) A method of isolating the winter wheat [-derived] chitinase cDNA of claim 12 having a nucleotide sequence which encodes an amino acid sequence listed as SEQ. ID. No. 1 in Fig. 1, a winter wheat [-derived] chitinase cDNA having a nucleotide sequence corresponding to an amino acid sequence listed as SEQ. ID. No. 2 in Fig. 2, a winter wheat [-derived] chitinase cDNA having a nucleotide sequence corresponding to an amino acid sequence listed as SEQ. ID. No. 3 in Fig. 3, said method comprising the steps of:

extracting mRNA from winter wheat variety that has undergone a sufficient hardening process:

preparing cDNA and a cDNA library based on said mRNA;

analyzing nucleotide sequences of a number of plant-derived chitinase cDNAs which have all been published by EMBL/Genebank/DDBJ DNA Databank;

designing a pair of chitinase cDNA-specific degenerated primers with reference to highly conserved nucleotide sequence portions of the plant-derived chitinase cDNAs;

conducting PCR (polymerase chain reaction) using a pair of chitinase cDNA-specific degenerated primers and using said cDNA as a template, thereby amplifying fragments of chitinase cDNAs and obtaining amplified DNA fragments; and



using said amplified DNA fragments as probes for screening said cDNA library by a hybridization assay, to isolate recombinant plaques containing full length cDNA.